Title: Seismic evaluation of existing DOE facilities: a case study at LANL

Authors: Lawrence Goen, Los Alamos National Laboratory
Robert Kennedy, RPK Structural Mechanics
Brian McDonald, Exponent
Troy Morgan, Exponent
Michael Salmon, Los Alamos National Laboratory
Andrew Whittaker, MCEER/University at Buffalo
Loring Wyllie, Degenkolb Engineers

Abstract: There is a significant inventory of older, mission-critical facilities across the DOE complex. The seismic evaluation of these facilities is challenging because the framing systems employed in these buildings is generally substantially different from those used in commercial buildings, for which efficient analysis and assessment procedures have been developed, including FEMA 273/274/356/P-58 and ASCE 41. Important differences in older DOE facilities include long spans for laboratories used for materials processing, which will generally be more vulnerable to vertical than horizontal shaking; the presence of box-like vaults for materials storage, creating hard points in the building and shear-critical framing; and discontinuous framing, made necessary due to programmatic constraints. Industry guidelines and standards have not been prepared for these types of structures, which makes the process of evaluation and peer review difficult. Importantly, soil-structure-interaction analysis, which is rarely addressed in the seismic evaluation of buildings and thus receives little attention in thee guidelines and standards, is routinely performed for safety-related nuclear structures.

The case study presented here is a mission-critical building at the Los Alamos National Laboratory. The presentation will describe the challenges faced by the participants in the project (consultants, Laboratory technical staff, and peer reviewers), the lessons learned in the project (which continues at the time of this writing), and the need to adapt existing industry guidelines and standards to address the framing systems that are unique to DOE facilities.